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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Kalin Liefer
Elroy Schoenbeck

GROUP NO.: 3724

SERIAL NO.: 09/358,666

EXAMINER: Kim Tran

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FOR: APPLIANCE FOR REDUCING DISTORTION OF SLIT METAL SHEET

October 16, 2001

Commissioner for Patents
Washington, D.C. 20231

Attn: Board of Patent Appeals and Interferences

REVISED APPELLANT'S BRIEF (37 CFR 1.192)

BOARD OF PATENT APPEALS
AND INTERFERENCES

OCT 22 2001

RECEIVED

On May 11, 2001, applicants filed a notice of appeal in the above-designated application to have the Board of Appeals and Interferences review the decision of the primary examiner finally rejecting claims 1, 4-10, 13, 16-18 and 22-26 of the application. Applicants, in furtherance of that appeal and pursuant to 37CFR 1.192, file this brief in triplicate.

Applicants further submit a check in the sum of \$155 to cover the fee prescribed by 37 CFR 1.17(c) for filing this brief. The Patent Office is authorized to charge any deficiencies in the fee against Deposit Account 162201.

The claims on appeal appear in the Appendix to this brief.

I REAL PARTY IN INTEREST

Red Bud Industries, Inc., a corporation of the State of Illinois having its principal place of business in Red Bud, Illinois, constitutes the real party in interest in this appeal. Applicants formally transferred the invention of the application to Red Bud Industries in an assignment recorded on July 22, 1999, at reel 010131, frame 0234. Red Bud Industries manufactures a variety of equipment for handling, slitting, shearing and straightening metal sheet.

II RELATED APPEALS AND INTERFERENCES

Appellant knows of no appeals or interferences which will directly affect or be directly affected by or will have a bearing on the Board's decision in this appeal.

III STATUS OF CLAIMS

Applicants filed the application with claims 1-21. In Amendment A, filed November 21, 2000, applicants amended claims 1, 4, 5, 8, 12, 13, 16 and 17; cancelled claims 2, 3 and 11; and added claims 22-26. The office action of February 14, 2001, addressed the claims as presented in Amendment A. In that office action the examiner finally rejected claims 1, 4-10, 13, 16-18 and 22-26, while allowing claims 19-21 and indicating that claims 12, 14 and 15, would be allowed if written in independent form. While claims 1, 4-10, 13, 16-18 and 22-26 stand finally rejected, applicants pursue their appeal only as to claims 16-18 and 22-26.

IV STATUS OF AMENDMENTS

Following Amendment A, the examiner called applicants' attorney and observed that claim 14 erroneously depended from itself. The attorney gave approval to amend the claim so that it depends from claim 8. Applicants assume that the examiner entered the amendment, although no record appears of it in the last office action.

V SUMMARY OF THE INVENTION

Steel mills furnish steel sheet M in large coils R which rarely correspond to the width of any products that are made from the sheet (Fig. 1 – page 2, lines 11 and 12). Typically, fabricators slit the sheet, producing long longitudinal slits T that border strips S of the desired width and later shear those strips S to produce panels of the desired length. Those panels pass on to subsequent fabricating (page 2, lines 12-16).

To produce the longitudinal slits T, the metal sheet M is withdrawn from the coil R in which it is furnished and is fed into a slitting machine C (Figs. 1 and 4 – page 4, lines 7-10), which basically comprises two mandrels 10 and 12 fitted with circular knives 14 and 16, respectively (Figs. 2 and 4, page 4, lines 15-21). Each knife 14 and 16 includes a disk 20 having a narrow peripheral surface 24 of cylindrical configuration. While the disks 20 of the two knives 14 and 16 are offset axially, they still are close enough for their peripheral surfaces 24 to form a nip into which the metal sheet M is fed. Here the spacing between the cylindrical envelopes formed by the peripheral surfaces 24 is less than the thickness of the metal sheet M (page 5, lines 9-18). When the sheet M passes into the nip, the sheet M fractures, thus producing the slit T (Fig. 1 – paragraph bridging pages 5 and 6). But one of the knives 14, 16 tends to deflect the sheet M upwardly and

the other tends to deflect it downwardly, and while mechanisms 28 exist to resist excessive deflection, the strips S leave the knives 14 and 16 with random stresses that create deformations in the regions immediately inwardly from the edges (page 6, lines 13-16). The deformations take the form of warpage (page 3, line 4). Applicants' invention minimizes the distortions (page 12, lines 7-9).

Basically, the invention as claimed resides in a pair of rollers 80 (Figs. 3 and 4 – page 9, lines 2 and 19-22) actually “first” and “second” rollers – which are located beyond the nip created by a pair of knife disks 20 in a slitting machine C and rotate about axes that are parallel to like axes of rotation for the knife disks 20 (Fig. 4 – page 13, lines 6-8). The rollers 80 are aligned with the knives 14 and 16 so that the strips S which emerge from the disks 20 of the knives 14 and 16 pass between the rollers 80 (Fig. 4 – page 11, lines 11-17). Moreover, the rollers 80 have cylindrical exterior surfaces (page 9, line 13) where they contact the strips S laterally from the slit T and are urged together with enough force to reduce distortions imparted to the strips S by the knives 14 and 16 (page 10, lines 10-13; page 12, lines 5-9). Indeed, applicants subsequently learned that the cylindrical rollers 80 not only reduce distortions in the areas of the strips S that they actually contact, but also in areas located inwardly from the rollers 80. The cylindrical surfaces of rollers 80 are preferably at least 2 inches long (page 10, line 13).

VI ISSUES

This appeal presents the following issues for determination by the Board.

- (a) Whether or not U.S. Patent 3,724,251 (the Wegner patent), within the meaning of 35 USC 102(b), anticipates the combination set forth in independent claim 24.
- (b) Whether or not the Wegner patent renders the combination set forth in claims 22, 23, 24 and 25 obvious within the meaning of 35 USC 103(a).
- (c) Whether or not the Wegner patent renders the process set forth in claims 17 and 18 obvious within the meaning of 35 USC 103(a).
- (d) Whether or not the Wegner patent renders the combination set forth in claim 16 obvious.

VII GROUPING OF CLAIMS

The claims lend themselves to the following groupings

- Group I claim 24
- Group II claims 22, 23, 25 and 26.
- Group III claims 17 and 18
- Group IV claim 16

Applicants do not pursue this appeal as to claims 1, 4-10, and 13.

VIII ARGUMENTS

A. Whether or not the Wegner patent anticipates the combination set forth in claim 24 within the meaning of 35 USC 102(b)

In order for a reference to anticipate a claim under 35 USC 102, the reference must teach every element of the claim. MPEP 2131. A claim is anticipated only if each and every element as set forth in the claim is found, whether expressly or inherently, in a single prior art reference. Verdegaal v. Union Oil, 2 USPQ2d 1051,1053 (CAFC, 1987).

Claim 24 calls for first and second rollers located beyond a nip formed by knife disks in a slitting machine and specifies that the rollers have substantially cylindrical exterior surfaces along which they bear against strips that emerge from the knife disks, with the slit between the strips being between the ends of those first and second rollers. The claim further requires that the rollers are urged together with enough force to reduce distortions imparted to the strips by the knife disks. The Wegner patent does not show substantially cylindrical rollers which both contact the sheets and are urged together to compress the sheet between them as the claim requires.

Quite to the contrary the Wegner patent shows an edge conditioner 24 having rolls 30 and 31 between which strips 20 of metal sheet pass, but the rolls 30 and 31 are tapered (col. 5, line 40; col. 9, line 33) or beveled (col. 13, line 10), that is to say, they possess a frustoconical configuration (col. 5, line 29; col. 7, line 45). A beveled or tapered roller does not constitute a substantially cylindrical roller as the claim requires. Hence, claim 24 does not describe the machine of the Wegner patent and therefore is not anticipated of the Wegner patent.

To be sure, the Wegner patent shows cylindrical rolls 84 and 85 and more cylindrical rolls 86 and 87 between which the metal strips 20 pass after being slit, but the metal sheet is not compressed between them as the claim requires. On the

contrary, the lower rolls 85 and 87 are out of contact with the metal sheet (col 9, line 27).

B. Whether or not the Wegner patent renders the combination set forth in claims 22, 23, 25 and 26 obvious.

Claims 22, 23, 25 and 26, in addition to specifying that rollers between which sheet metal strips are compressed have cylindrical surfaces, further require that the cylindrical surfaces are at least 2 inches long.

According to the examiner, the Wegner patent discloses the invention substantially as set forth in claims 22, 23, 25 and 26, "except for the length of the cylindrical surfaces". This statement in itself mischaracterizes the Wegner patent, because the Wegner patent does not show rollers having cylindrical surfaces that actually work the metal sheet. Having ignored the real shape of the rollers 30 and 31 in the Wegner patent, the examiner goes on to remark that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide cylindrical surfaces of varying length, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art."

Metal sheet after emerging from a slitting machine may contain random stresses that produce deformations in the regions along the edges of the strips and inwardly from those regions as well, and these deformations take the form of warpage or waviness (page 3, line 4). Applicants discovered that compressing the sheet between cylindrical rollers that are at least 2 inches long will reduce the stresses and with it the distortions that they create. The problem resides not so much at the edges formed by the slits, but

instead in the regions leading up to the edges. Applicants' rollers act in these regions, and claims 22-25 so specify.

The machine of the Wegner patent above each slit along the strips 20 emerging for the slitter 22, has two work rolls 30 and 31 which rotate on a common axle, with a spacer 33 of lesser diameter between them, thus producing an axial gap between the rolls 30 and 31 (Fig. 3). Another pair of rolls 30 and 31 lies below the strips 20. Moreover, the rolls 30 and 31 of each pair have the gap that is between them in registration with the slit, so the rolls 30 bear against the strip 20 on one side of the slit and the rolls 31 bear against the adjacent strip 20 on the other side of the slit. Each roll 30 and 31 is quite narrow, measuring no more than 7/16 inch (col.13, line 9), and furthermore has its peripheral surface beveled, that is tapered downwardly away from the gap between the pair of rolls 30 and 31. This enables the rolls 30 and 31 to bear against the corner edges of the adjacent strips. "In this way any sharp protruding corner is essentially rolled down, as likewise any and all other burrs, projections or deformities" (col. 5, lines 35-39). By reason of the narrow axial dimension of the rolls 30 and 31 and the taper of their peripheral surface, contact with the strips 20 is confined to the corner edges (col. 5, lines 35-43), not the surface areas of the strips 20.

By contrast, applicant's invention, as set forth in claims 22-26, seeks to remove random stresses that form deformations in the strips of slit metal sheet inwardly from the edges, and that is achieved by compressing adjacent strips between cylindrical rollers that extend well past the slit between the strips. Being cylindrical, the rollers bear against the surface areas of the strips, not against the edges. Indeed, claims 22, 23, 25 and 26 specify that the cylindrical surfaces on the rollers are at least 2 inches wide.

This brings the rollers into regions of the strips where distortions are likely to exist as a consequence of the fracture produced by the rotating knives – distortions that produce warpage and waviness in the strips, particularly along the side regions of the strips.

Applicants' invention as set forth in claim 22, 23 25 and 26 and the Wegner patent address two different problems and solve those problems with rollers of different configurations. Indeed, the Wegner patent does not even recognize the problem solved by applicant, that is distortions which are imparted to strips of metal sheet in a slitting operation. One having ordinary skill in connection with machines for handling metal sheet would not be expected to turn to the Wegner patent when searching for a way to eliminate distortions imparted to strips of metal sheet, because the patent does not address the problem. Even if such a person utilized the rolls 30 and 31 of the Wegner patent, all that person would achieve is to blunt the edges of the strips, not eliminate deformations of the type addressed by applicants' invention.

Nowhere, does the Wegner patent suggest compressing strips of slit metal sheet between rollers having cylindrical exterior surfaces that are at least 2 inches long as the claims require. Indeed, the only inspiration for this aspect of applicants' invention comes from the application itself.

When obviousness is based on a single prior art reference, there must be a showing or a suggestion or motivation to modify the teachings of that reference. That motivation suggestion or teaching may come from statements in the prior art, the knowledge of one of ordinary skill in the art, or in some cases the nature of the problem solved. In re Kotzab, 55 USPQ2d 1313, 1316. (CAFC, 2000). The mere fact that a prior art reference can be modified to create the claimed invention does not make the

modification obvious unless the prior art suggests the desirability of the modification. In re Laskowski, 10USPQ2d 1397 (CAFC 1989).

Here the examiner characterizes the tapered rollers 30 and 31 of the Wegner patent as cylindrical and concludes that it would be obvious to make them at least 2 inches long, because it simply represents discovering an optimum working range. Changing the shape of a roller and extending its length and further using it for a different purpose represent more than discovery of optimal ranges. No motivation exists in the Wegner patent or anywhere else to use cylindrical rollers or to make them at least 2 inches long, all to eliminate distortions as the claims require, and hence applicants' invention as set forth in claims 22, 23, 25 and 26, is not rendered obvious by the Wegner patent.

Indeed, the only suggestion for using cylindrical rollers and making them 2 inches long comes from the application here on appeal. However, to use applicants' own disclosure to formulate a case for obviousness represents an impermissible hindsight reconstruction. It is impermissible to use the claimed invention as an instruction manual or template to piece together the teachings of the prior art so that an invention is rendered obvious. In re Fitch, 23 USPQ2d 1780, 1784 (CAFC, 1992). To imbue one of ordinary skill in the art with knowledge of an invention, when no prior art reference or references suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher. In re Zurko, 42 USPQ2d 1476, 1479 (CAFC, 1997).

C. Whether or not the Wegner patent renders the process set forth in claims 17 and 18 obvious.

Claims 17 and 18 are directed to a process for reducing distortion of metal sheet caused by rotating knives when such knives slit the sheet. To this end, the claims call for passing the metal sheet between opposed rollers after it is slit, with the rollers bridging the slit in the sheet and being urged together such that the metal on both sides of the slit is compressed between the opposed rollers. According to the claims, the rollers have substantially cylindrical surfaces that are at least 2 inches long. The examiner concludes that the Wegner patent renders the foregoing process obvious.

Here again, one seeking a process for removing distortions from slit metal sheet would not turn to the Wegner patent for inspiration, because that patent does not address the problem. Removing distortions, which applicants' process accomplishes, differs from removing edge burrs with which the process of the Wegner patent concerned. Indeed, the Wegner patent assumes the total absence of distortions in the metal sheet leaving the slitter, for the patent observes (col. 12, line 16-22):

"A very important result of the invention is that the corner deformation is easily controlled or limited to no more than is needed for satisfactory burr removal, without so much rolling effect as would materially elongate the region near the edge and create a wavy condition of the strip lengthwise at that region."

Typically, the procedure for removing distortions from metal sheet involves stretching the metal sheet beyond its elastic limit as in U.S. Patent 4,866,967 (Sporenberg) which is also cited against the application. Thus, a person seeking to reduce distortions imparted to metal sheet by a slitting machine could be expected to turn to the Sporenberg patent for inspiration, but certainly not the Wegner patent which focuses on removing edge burrs.

Hence, process claims 17 and 18, like the combination claims 22, 23, 25 and 26, are believed to be allowable over the Wegner patent.

D. Whether or not the Wegner patent renders the combination set forth in claim 16 obvious.


Claim 16 depends from claim 15 which in turn depends from claim 14. In the Office action of February 14, 2001, the examiner objected to claims 14 and 15 inasmuch as they depended from a rejected base claim – claim 8 in this instance – but remarked that they would be allowable if rewritten in independent form.

Since rejected claim 16 contains all of the limitations of allowable claims 14 and 15 from which it depends, claim 16 should likewise be allowable.

IX CONCLUSION

Claims 17, 18, and 22-26 on appeal call for removing distortions, such as warpage, from slit metal sheet by compressing the sheet at the slit in it between cylindrical rollers. Indeed, most of the claims specify that the rollers are at least 2 inches long. The Wegner patent does not anticipate these claims nor render them obvious, because it does not disclose cylindrical rollers that compress a sheet between them, much less rollers that are at least 2 inches long, and just as importantly, the Wegner patent does not address the problem of removing distortions – only burrs. Hence, claims 17, 18 and 22-26 are believed to be allowable and a reversal of the final rejection of those claims is respectfully requested.

Respectfully submitted,



Edward A. Boeschstein, Reg. N. 22,986
Polster, Lieder, Woodruff & Lucchesi, L.C.
763 South New Ballas Road
St. Louis, Missouri 63141
Phone (314)872-8118
Fax (314)991-2178

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner for Patents and Trademarks, Washington, D.C. 20231, on October 16, 2001.



Edward A. Boeschstein, Reg. 22,986

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APPENDIX

1. In combination with a machine for slitting metal sheet, said machine having at least one pair of knives including disks which rotate about parallel axes and approach each other at a nip into which the metal sheet passes and where the metal sheet is fractured so that sheet leaves the nip along a path as strips separated by a slit, the improvement comprising: first and second pivot mounts mounted on the machine; first pivot arms on the first pivot mount where they pivot about an axis parallel to the axes of the knife disks; second pivot arms on the second pivot mount where they pivot about an axis parallel to the axes of the knife disks; a first roller carried by the first arms, and a second roller carried by the second arms; the first and second rollers being located beyond the nip and being capable of rotating about axes parallel to the axes of rotation for the knife disks, the rollers being aligned with the nip between the knife disks and being along the path taken by the strips so as to receive the strips, with the slit being located between the ends of the rollers, the rollers being urged together so that the strips will be compressed between them, whereby the rollers reduce distortion of the strips.

4. The combination according to claim 1 and further comprising a first spring carried by the mount and acting on the first pivot arms to urge the first roller toward the second roller, and a second spring carried by the second mount and acting on the second pivot arms to urge the second rollers toward the first rollers.

5. The combination according to claim 4 wherein the pivot arms extend obliquely from their pivot mounts toward the path along which the strips move as they

emerge from the knives such that the axes of the rollers are offset in the direction of the path with respect to axes on which the pivot arms pivot on their mounts.

6. The combination according to claim 4 and further comprising first and second tracks located on the machine where they extend parallel to the axes about which the knives rotate, the first mount being fitted to the first track such that it can move along the second track..

7. The combination according to claim 4 and further comprising a first clamp fitted to the first mount such that the first track is captured between the first mount and the first clamp; and a second clamp fitted to the second mount such that the second track is captured between the second mount and the second clamp.

8. In a slitting machine including a frame, first and second mandrels mounted on the frame for rotation about parallel axes, and first and second knives mounted on the first and second mandrels, respectively, with each knife having a disk which rotates with its mandrel, the disks of the first and second knives, when rotating, approaching each other at a nip and being located such that metal sheet upon entering the nip is fractured by the disks, thus imparting a slit to the metal sheet and dividing the sheet into strips which are separated by the slit, the improvement comprising: a first roller assembly mounted on the frame and having a first roller located beyond the first knife and aligned with the nip such that one face on each of the strips will pass along it with the slit being between the ends of the first roller, and a second roller assembly mounted on the frame and having a second roller located beyond the second knife and aligned with the nip such that the other face of each of the strips will pass along it with the slit being between the ends of the second roller, each roller assembly including a mount, a

pair of pivot arms attached to the mount such that they pivot about an axis that is parallel to the axes of the mandrels, the roller for each roller assembly being carried by the pivot arms of the assembly and rotating about an axis that is offset in the direction of the strips from the axis of the arms, yet parallel to the axis of the arms, and a spring carried by the mount and acting upon the arms to urge the roller that is carried by the arms toward the path taken by the strips of metal sheet as they emerge from the knives.

9. The combination according to claim 8 wherein the first roller assembly includes a first spring which urges the first roller toward the path taken by the strips of metal sheet, and the second roller assembly includes a second spring which urges the second roller toward the path taken by the strips of metal sheet.

10. The combination according to claim 9 wherein the second roller is located opposite the first roller so that the strips of metal sheet are compressed between the first and second rollers after they emerge from the knives.

12. The combination according to claim 8 wherein each roller assembly further includes a spring pad on the pivot mount for the assembly and spacer located between and attached to the pivot arms for the assembly; and wherein the spring is located between and acts against the spring pad and the spacer.

13. The combination according to claim 12 wherein the strips of metal sheet emerge from the disks along a path; and wherein each mount projects from the frame toward the path taken by the strips of metal sheet, and the arms extend from their mounts obliquely with respect to the path taken by the strips of metal sheet.

14. The combination according to claim 8 and further comprising first and second tracks located on the frame parallel to the axes of the mandrels; and wherein

the mount of the first roller assembly is fitted to the first track such that it can slide along the track, yet cannot leave the first track; and wherein the pivot mount of the second roller assembly is fitted to the second track such that it can slide along the second track, yet cannot leave the second track.

15. The combination according to claim 14 wherein each roller assembly has a clamp which is attached to the pivot mount of the roller assembly; and wherein the pivot mount and clamp of the roller assembly are configured to capture the track along which the roller assembly moves.

16. The combination according to claim 15 wherein the pivot mount for each pivot assembly projects from the track for the pivot assembly toward the path taken by the strips of metal sheet as they emerge from the knives; and the arms of the pivot assembly extend obliquely with respect to the path such that the axes of the rollers are offset in the direction of the path with respect to the axes on which the pivot arms pivot on their mounts.

17. A process for reducing distortion of metal sheet by rotating knives when such knives slit the sheet, said process comprising passing the metal sheet between opposed rollers after it is slit, with the rollers bridging the slit in the sheet and being urged together such that the metal sheet on both sides of the slit is compressed between the opposed rollers, the rollers having substantially cylindrical surfaces along which they contact the metal sheet, with the cylindrical surfaces being at least about 2 inches long.

18. The process according to claim 17 wherein the opposed rollers are urged together under a spring bias.

19. A roller assembly for installation on a machine for slitting metal sheet to reduce distortion of the metal sheet after it is slit, said roller assembly comprising: a pivot mount configured at one end to engage a track; pivot arms attached to the other end of the mount for pivotal movement about a first axis, the arms projecting away from the pivot mount; a roller carried by the pivot arms for rotation about a second axis that is parallel to the first axis; a spacer extending between the pivot arms and located outwardly from the pivot mount; a spring pad on the pivot mount and located opposite the spacer; and a spring located between the spacer and the spring pad for urging the pivot arms and the roller away from the spring pad.

20. A roller assembly according to claim 19 wherein the spring comprises a succession of Belleville washers.

21. A roller assembly according to claim 19 wherein the pivot mount contains a groove that extends parallel to the axes, the groove being configured to receive a track such that the pivot mount can slide along the track.

22. The combination according to claim 1 wherein each roller has a substantially cylindrical surface along which it contacts the strips that emerge from the nip, and the cylindrical surface is at least about 2 inches long.

23. The combination according to claim 8 the roller of each roller assembly has a substantially cylindrical exterior surface along which it contacts the strips that emerge from the nip formed by the disks, and the cylindrical surface is at least about 2 inches long.

24. In combination with a machine for slitting metal sheet, said machine having at least one pair of knives including disks which rotate about parallel axes and

approach each other at a nip into which the metal sheet passes to be fractured, so that sheet leaves the nip along a path as strips separated by a slit, the improvement comprising: first and second rollers which are located beyond the nip and rotate about axes that are parallel to the axes of rotation for the knife disks, the rollers being aligned with the nip between the knife disks and being along the path taken by the strips so the strips pass between the rollers with the slit being located between the ends of the rollers, the rollers having substantially cylindrical exterior surfaces along which they contact the strips laterally from the slit and being urged together with enough force to reduce distortions imparted to the strips by the knives.

25. The combination according to claim 24 wherein the cylindrical surfaces of the rollers are at least about 2 inches long.

26. The combination according to claim 24 wherein the cylindrical surfaces of the rollers are between about 2 inches and about 4 inches long.